Design of plane aperture antennae

S/109/61/006/009/006/018
D201/D302

$$\int_{a_2(\eta)}^{a_1(\eta)} \dot{A}(\xi, \eta)\, d\xi = k_2 J_2(\eta), \tag{7}$$

where $J_1(\xi)$, $J_2(\eta)$ are the amplitude-phase distribution of linear antennae and $k_1$, $k_2$ are constants. These two equations may be considered as a system which permit the synthesis of plane aperture antennae from known, in the main planes, directivity patterns. $J_1(\xi)$ and $J_2(\eta)$ are, therefore, considered to be known and the possibility of determining $A(\xi, \eta)$ and $b(\xi)$ is explored with the aim of applying the design procedure of linear antennae to that of plane aperture antennae. Two kinds of amplitude-phase distributions are then considered. The first kind when the amplitude phase characteristic can be represented by explicit distributions of both amplitude and phase as in

$$\dot{A}(\xi, \eta) = \dot{A}_1(\xi)\, \dot{A}_2(\eta)$$

Card 3/8

and the second when both remain implicit in the expression for $A(\xi, \eta)$. For explicit representation two types of problems are considered. 1) The aperture $(b(\xi))$ is symmetrical with respect to axis. a) In phase symmetrical distribution. The author concludes here that the effective distribution $J_1(\xi)$ is equal to the distribution of a plane antenna in the direction of the $\xi$ axis, multiplied at every point by a quantity proportional to the effective moment of the cross section in $\eta$ axis direction. b) Asymmetrical in phase distributions. The evaluation of amplitude phase distribution is carried out. c) Symmetrical out-of-phase distributions. For an odd phase distribution $\Psi_2(\eta)$ the basic equation has the form of

$$A_1(\xi)e^{j\psi_1(\xi)}\int_0^{b(\xi)} A_2(\eta)\cos\psi_2(\eta)\,d\eta = J_1(\xi)\,e^{j\varphi_1(\xi)}. \qquad (12)$$

It follows that $\Psi_1(\xi) = \varphi_1(\xi)$ and $\Psi_2(\eta)$ influences the effective amplitude distribution. 2) The second type of problem is when the

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aperture is symmetrical with respect to both $\xi$ and $\eta$ axes. With in-phase symmetrical distribution, the problem reduces to a set of two simultaneous equations

$$A_1(\xi)\int_0^{b(\xi)} A_2(\eta)\,d\eta = k_1 J_1(\xi), \tag{13}$$

$$A_2(\eta)\int_0^{a(\eta)} A_1(\xi)\,d\xi = k_2 J_2(\eta), \tag{14}$$

When the distribution is implicit, the knowledge of it in one plane does not result in much information about the distribution in other planes, so that the solution of problems of implicit distribution is hardly possible and only one case is considered, i.e. that of symmetrical in-phase distribution, for which

$$\int_0^{b(\xi)} A(\xi,\eta)\,d\eta = J_1(\xi). \tag{21}$$

Card 5/8

is given, which has to be solved. If $A(\xi, \eta)$ is given then after integrating (21) an expression is obtained for finding $b(\xi)$. When $b(\xi)$ is given, Eq. (21) in its general form cannot be solved as an infinite number of solutions can be obtained. The following solutions of Eq. (21) are recommended: a)

$$A(\xi, \eta) = \sum_{k=0}^{N} \frac{a_k}{F_k[b(\xi)]} f_k(\eta) J_1(\xi), \tag{22}$$

in which $f_k(\eta)$ - an arbitrary, easily integrated function;

$$F_k(\xi) = \int_0^{\xi} f_k(\eta)\, d\eta;$$

b)

$$A(r_1) = -\frac{dJ_1[a(1 - r_1)]}{dr_1} \tag{23}$$

where $r_1 = 1 + \eta - b(\xi)$;

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c) $$A(r_2) = \frac{2}{\pi}\left[\frac{J_1[a(0)]}{\sqrt{1-r_2^2}} - \int_{r_2}^{1} \frac{dJ_1[a(\sqrt{1-Z^2})]}{\sqrt{Z^2-r_2^2}}\right], \tag{24}$$

where $r_2 = \sqrt{1 + \eta^2 - [b(\xi)]^2}$; $a(\eta)$ - a function inverse of $b(\xi)$. Finally the "artificial" rocking of the beam is considered. This method can be successfully applied to visualize to full directional pattern from one plane only. Since a linear phase shift produces the shift of the main lobe and of the whole of the pattern in the generalized system of coordinates

$$\int_0^{b(\xi)} A(\xi,\eta) \cos \alpha\eta d\eta = J_{1\alpha}(\xi) \tag{25}$$

represents, in fact, the effective distribution of a linear antenna, whose directional pattern coincides with that of a plane aperture antenna in the cross section plane $u_2 = \alpha$. Taking different $\alpha$ the patter can be studied for any required number of cross sections.

Card 7/8

3976

**A SIMPLE RADIATION DETECTOR.** L. Ya. Davidchuk and K. V. Chmutov. Zhur. Fiz. Khim. 30, 2807(1956) Dec. (In Russian).

A simply constructed device, consisting of 4 parts, is offered for detection of radioactive pollution in laboratories, work places, clothes, etc. The detector can be operated as an attachment to any radio apparatus or any instrument with a low frequency amplifier (TV, magnetophone, etc.). (R.V.J.)

DAVIDE, Vladimir, (Zagreb)

An axiom system for natural numbers and their ordering. In English.
Gl mat fiz Hrv 15 no.3:153-159 '60. (EEAI 10:8)
(Numbers, Theory of)

TACU, Al; DAVIDEANU, N.

Study on the analysis of increase of labor productivity in integrated cotton mills. Ind text Rum 14 no.2:49-54 F '63.

1. Academia R.P.R. - Filiala Iasi.

DAVIDEANU, N.; CIUCHI, P. (Iasi)

Scientific Session of the Rumanian Academy, Iasi Branch.
Probleme econ 17 no.10:144-145 O '64.

DAVIDEANU, N.; NICOLICIOIU, C.; DUMITRU, P.

Contribution of material incentive to the increase of production in textile enterprises. Ind text Rum 16 no.1:12-17 Ja '65.

1. Faculty of Economic Sciences, "Al.I.Cuza" University, Iasi.

MATEESCU, M., ing.; DAVIDEANU, R.

Commemorative Scientific Session of the Gh. Asachi Polytechnic Institute, Iasi. Ind text Rum 14 no.5:220 My '63.

BURDUJA, I., conf.; NETEA, M., lector ing.; DAVIDEANU, Ronelia, lector; BLANARU, Elena, asist. ing.

Contributions to the classification of the ways of reducing specific consumptions of wool. Ind text Rum 14 no.11:507-511 N'63.

DAVIDEK, J.; SIL'YANOVA, Yu.

Polarographic determination of chlorogenic acid. Biokhimiia 30 no.5:927-932 S-O '65. (MIRA 18:10)

1. Khimiko-tekhnologicheskiy institut, Praga, i Sel'skokhozyaystvennyy institut, Kazan'.

DAVIDEK, J.

Synergists of L-ascorbic acid. J. Fragner and J. Davídek (Výzk. ústav potrav. technol., Prague). *Průmysl Potravin* 7, 334-5(1956).—Review with 17 references. L. J. U. Med

2

SO: EEAL - Library of Congress
Vol. 5, No. 12, Dec. '56.

DAVIDEK, J.

CZECHOSLOVAKIA / Chemical Technology. Chemical Products. H
Drugs. Vitamins. Antibiotics.

Abs Jour: Ref Zhur-Khimiya, 1958, No 20, 68455.

Author : Davidek J., Fragner J.
Inst : ~~Not given~~.
Title : Photometrical Determination of Ruthenium.

Orig Pub: Ceskosl. farmac., 1957, 6, No 8, 449-450.

Abstract: A method for the determination of ruthenium (I) is proposed which consists in the formation of a brownish-red coloring when I interacts with the diazo n-aminobenzoic acid (II). To 1cc of 0.5% solution of II in 10% $H_2SO_4$, 2cc of 0.2% $NaNO_2$ solution is added. After mixing a solution of I in $CH_3OH$ (2-28 $\gamma$/cc) is added, followed by additional mixing and by alkalization with 5 cc of 10% NaOH solution, dilution to 25cc, and by photometri-

Card 1/2

CZECHOSLOVAKIA / Analytical Chemistry. Analysis of Organic Substances. E-3

Abs Jour : Ref Zhur - Khim., No 15, 1958, No 50061

Author : Manousek, Osvald; Konupcik, Milan; Davidek, Jiri.

Inst : Not given

Title : Polarography of Derivatives of Urea and Thiourea. XI. Polarographic Determination of 1,3-Dimethyl-4-Amino-5-nitrosouracil in Industrial Samples.

Orig Pub : Ceskosl. farmac., 1957, 6, No. 10, 593-594.

Abstract : The polarographic curves of 1,3-dimethyl-4-amino-5-nitrosouracil (I) have one wave in an acid medium as well as in an alkaline. At pH of 6.70, E = -0.44 v; at pH less than 4, a sharp maximum is observed. The height of the wave does not depend on pH in phosphate buffer solutions (II) at pH of 6.1-8.2. For the quantitative determination, 0.040 g. of I is dissolved in 100 ml. of water and 10 ml.

Card 1/2



CZECHOSLOVAKIA / Analytical Chemistry. Analysis of Organic Substances. E-3

Abs Jour : Ref Zhur - Khim., No 15, 1958, No 50061

of II (pH = 6.7) is added to 2 ml. of the prepared solution. Polarographing is carriedout blowing $N_2$ through the solution. A determination takes less than 15 min., the accuracy is from plus/minus 2 to plus/minus 3%. For the iodometric titration of I practiced so far, 0.1 g. of the substance was necessary, the determination took 3 hours and the results were badly reproducible. See RZh Khim, 1958, 31895, for the report X. -- N. Turkovich.

Card 2/2

CZECHOSLOVAKIA/Chemical Technology. Pharmaceuticals. Vitamins. Antibiotics. H

Abs Jour: Ref Zhur-Khim., No 24, 1958, 82670.

Author : Davidek J., Manousek O.
Inst :
Title : The Polarographic Determination of Rutin in Pharmaceutical Preparations.

Orig Pub: Ceskosl. farmac., 1958, 7, No 2, 73-75.

Abstract: The method of polarographic determination of rutin (I) in the form of its nitroso derivative is described. The presence of ascorbic acid and the compounds occurring with I does not hinder the determination. The method is more sensitive than a direct polarographic analysis and the usual procedure of colorimetric determination. The nitroso

Card : 1/2

4

CZECHOSLOVAKIA/Chemical Technology. Pharmaceuticals. Vitamins. Antibiotics. H



Abs Jour: Ref Zhur-Khim., No 24, 1958, 82670.

derivative of I gives a sharp wave even when the concentration of I in the testing solution is $10^{-6}$ moles.

Card : 2/2

COUNTRY : Czechoslovakia
CATEGORY : H-17

DAVIDEK, I.

Determination of flavonoids after their separation by paper chromatography. Biokhimiia 26 no. 1:93-98 Ja-F '61. (MIRA 14:2)

1. TSentral'nyy nauchno-issledovatel'skiy institut pishchevoy promyshlennosti, Praga.
(FLAVONOIDS)

DAVIDEK, J

SURNAME, Given Names

Country: Czechoslovakia

Academic Degrees: [not given]

2

Affiliation:

Source: Prague, Collection of Czechoslovak Chemical Communications, Vol 26, No 11, November 1961, pp 2947-2949

Data: "Thin Layer Chromatography on Polyamide Powder."

Authors:

DAVIDEK, J, Department of Chemistry and Food Technology, Institute of Chemical Technology, Prague

PROCHAZKA, Z, Institute of Chemistry and Biochemistry, Czechoslovak Academy of Sciences, Prague

DAVIDEK, J.; POKORNY, J.; POKORNA, V.

Analysis of dyes in lipstick by means of thin layer chromatography.
Cesk. hyg. 7 no.9:548-554 O '62.

1. Katedra chemie a zkouseni potravin Vysoke skoly chemicko-technologicke, Praha.

(DYES) (COSMETICS)

DAVIDEK, J. (Praha 6, Technicka 1905)

Influence of ch'orinated hydrocarbons on the stability of beta-carotene. cesk. hyg. 10 no.3:267-271 My '65

1. Vysoka skola chemicko-technologicka, Praha.

DAVIDEK, SHANDA

Czechoslovakia / Analytical Chemistry. E-3
Analysis of Organic Substances.

Abs Jour: Ref. Zhur - Khimiya, No. 2, 1958, 4384

Author : Davidek, Shanda

Title : Determination of Dehydroascorbic Acid by Means of Paper Chromotography.

Orig Pub: Ceskosl. Farmae., 1957, 6, No. 3, 151-153

Abstract: Dehydroascorbic acid (1) is determined by the difference in the results of the sample analysis before and after reduction with $H_2S$. The paper is spotted (diameter 1 cm.) in various points (in an atmosphere of $CO_2$) with the extract under investigation using 10 $\mu$l. of it on some spots and on the others 5 $\mu$l. of the extract plus 5 $\mu$l. of the standard ascorbic acid solution (11) at various concentrations. The chromotogram is

Card 1/2

Czechoslovakia / Analytical Chemistry. E-3
Analysis of Organic Substances.



Abs Jour: Ref. Zhur - Khimiya, No. 2, 1958, 4384

is developed with upper phase of a butanol acetic acid-water (4:1:5) mixture in ~ 4 hours and treated with 0.1% alcohol solution of 2-6-dichlorophenol indophenol, dried and the size of the spots are measured ($R_f$ = 0.37). By comparing the results, the amount of (11) is determined. The analogeous chromotogram is run for the sample to be analyzed which has been reduced with $H_2S$. By the difference the amount of (1) is determined.

Card 2/2

DAVIDENKO, A.A., kand.med.nauk

Hormonal diagnosis of hydatid mole and chorio epithelioma [with summary in English]. Akush. i gin. 35 no.1:65-68 Ja-F '59.
(MIRA 12:2)

1. Iz kafedry akusherstva i ginekologii (zav. - prof. V.N. Khmelevskiy) Kiyevskogo instituta usovershenvstvovaniya vrachey.
(HYDATIFORM MOLE, diagnosis,
frog test (Rus))
(CHORIOCARCINOMA, diagnosis,
same)

DAVIDENKO, A.A.

Evaluation of histological and hormonal methods for the diagnosis of chorioepithelioma. Akush. i gin. 36 no.3:30-32 My-Je '60. (MIRA 13:12)

(CANCER)

DAVIDENKO, A.A., dotsent

Comparative clinical evaluation of the spermatoid reaction of amphibia (review of the literature and personal observations). Akush.i gin. no.1:63-66 '62. (MIRA 15:11)

1. Iz kafedry akusherstva i ginekologii (zav. - prof. V.N. Khmelevskiy [deceased]) Kiyevskogo instituta usovershenstvovaniya vrachey (dir. - dotsent V.D. Bratus').
(PREGNANCY--SIGNS AND DIAGNOSIS)

DAVIDENKO, A.A., dotsent

Chorioepithelioma. Vrach. delo no.1:103-104 Ja '62. (MIRA 15:2)

1. Kafedra akusherstva i ginekologii No.1 (zav. - prof. V.N.Savitskiy) Kiyevskogo instituta usovershenstvovaniya vrachey.
(GENERATIVE ORGANS, FEMALE—CANCER)

DAVIDENKO, A.A., dotsent

Treatment of chorioepithelioma with large doses of estrogens. Akush. i gin. 40 no.1:121-123 Ja-F '64. (MIRA 17:8)

1. Kafedra akusherstva i ginekologii No.1 (zav. - prof. V.N. Savitskiy) Kiyevskogo instituta usovershenstvovaniya vrachey.

DAVIDENKO, A.I., Cand Agr Sci -- (diss) "Check-row planting of tobacco ~~of~~ of ~~the variety cheap~~ Tapered-leaf variety 2747 in the ~~level~~ Flat zone of Krasnodarskiy Kray." Krasnodar, "Soviet Kuban'," 1958, 15 pp. (Min of Agr USSR. Kuban' Agr Inst) 110 copies (KL, 32-58, 110)

DAVIDENKO, D.F.

Approximated solution for systems of non-linear equations. Ukr.mat.zhur. 5 no.2:196-206 '53. (MLRA 6:6)
(Differential equations) (Approximate computation)

DAVIDENKO, D. F.

USSR/Mathematics - Numerical Integration 1 Feb 53

"Certain New Method of Numerical Solution of a System of Nonlinear Equations," D. F. Davidenko, Inst of Math, Acad Sci, Ukrainian SSR

DAN SSSR, Vol 88, No 4, pp 601-602

Suggests a method of approximately solving a system of nonlinear eqs by reducing these systems to a system of ordinary differential eqs of the first order and numerically integrating the latter. Acknowledges helpful advice of N. N. Bogolynbov, who suggested the present topic. Presented by Acad S. L. Sobolev 18 Nov 52.

249T42

DAVIDENKO, D. F.

1 - F/W

Davidenko, D. F. On application of the method of variation of parameters to the theory of nonlinear functional equations. Ukrain. Mat. Ž. 7 (1955), 18–28. (Russian)

Let $G$ be a bounded closed region in $n$-dimensional space, $E$ the space of functions $\varphi(x)$ defined for $x \in G$ with norm $\|\varphi\| = \sup_{x \in G} |\varphi(x)|$ and $K(x, \varphi)$ a nonlinear functional on $E$ having a differential $\delta K(x, \varphi) = \int_G Q(x, x', \varphi)\, \delta\varphi(x')\, dx'$, where $Q(x, x', \varphi)$ is a functional of $\varphi \in E$ depending on $x, x' \in G$. In order to solve the equation (1) $\varphi(x) + \lambda K(x, \varphi) = 0$, where $\lambda$ is a real parameter, the author considers the solution as a function of $\lambda$, $\varphi = \varphi(x, \lambda)$, and uses the differentiated equation

$$\frac{\partial}{\partial \lambda} \varphi(x, \lambda) + \lambda \int_G Q(x, x', \varphi) \frac{\partial}{\partial \lambda} \varphi(x', \lambda)\, d\lambda = -K(x, \varphi)$$

which is linear in $\partial\varphi/\partial\lambda$. Its solution, given by the Fredholm resolvent, has the form $\varphi(x, \lambda) = \int_0^\lambda I(x, \lambda, \varphi(x, \lambda))\, d\lambda$. This functional equation, and with it (1), are shown to have a unique solution $\varphi(x, \lambda)$ satisfying $\|\varphi\| \leq L$ for all $\lambda$, $|\lambda| \leq \lambda^*$, where $\lambda^*$ is an explicitly given bound, provided the Fredholm determinant $D(\lambda, \varphi)$ of the kernel $Q(x, x', \varphi)$ satisfies $|D(\lambda, \varphi)| \geq a$ for $\|\varphi\| \leq L$, $x \in G$, $|\lambda| \leq d$, where $L$, $a$, $d$ are positive constants.

*M. Golomb* (Lafayette, Ind.).

DAVIDENKO, D. F

SUBJECT USSR/MATHEMATICS/Differential equations CARD 1/2 PG - 651
AUTHOR DAVIDENKO D.F.
TITLE On a difference method for the solution of the Laplace equation with axial symmetry.
PERIODICAL Doklady Akad.Nauk 110, 910-913 (1956)
reviewed 3/1957

In a domain G of the r,z-plane which is limited by the curve $\Gamma$, the solution of the equation

$$\Delta u = \frac{1}{r}\frac{\partial u}{\partial r} + \frac{\partial^2 u}{\partial r^2} + \frac{\partial^2 u}{\partial z^2} = 0$$

is sought which satisfies the condition $u|_{\Gamma} = \varphi$. G is covered by a net of lines, where the lines intersect in $\alpha_i(r_i,z_i)$. The solution is assumed in the neighborhood of $\alpha_o(r_o,z_o)$ to be in the form

$$(1) \qquad u(r,z) = a_{o,o} + \sum_{n=1}^{\infty}\left[a_{n-1,1}\Phi_{2n-1}(r,z) + a_{n,o}\Phi_{2n}(r,z)\right],$$

where the $\Phi_i$ are certain harmonic functions and the coefficients $a_{i,j}$ can be

Doklady Akad.Nauk 110, 910-913 (1956) CARD 2/2 PG -651

computed from conditions for the values of the derivatives of u and $\Phi_i$ in $(r_o, z_o)$. Setting up the representation (1) in all points $\alpha_i$ and forming the linear conbinations with suitable coefficients, then one obtains a difference equation which yields very exact values of u. An example is computed.

AUTHOR: Davidenko, D. F. 20-114-4-4/63

TITLE: On the Solution of Laplace's Equation With Axial Symmetry by a Difference Method (K voprosu o reshenii raznostnym metodom uravneniya Laplasa s osevoy simmetriyey)

PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol. 114, Nr 4, pp. 690-693 (USSR)

ABSTRACT: In a previous work (ref. 1) the author develops a difference method for the solution of the axially symmetric Dirichlet problem for the Laplace equation
$\Delta u = (1/r)\ \partial u/\partial r + \partial^2 u/\partial r^2 + \partial^2 u/\partial z^2 = 0$ (1). Here r denotes the radical coordinate and z the coordinate directioned along the symmetry axis. For the determination of concrete differential equations the author here constructed harmonic functions $\Phi_{2n-1}(r,z)$ $(n = 1,2,\dots)$ and $\Phi_{2n}(r,z)$ $(n = 0,1,\dots)$ by means of harmonic polynominals. Here the author obtains a further type of functions $\Phi_{2n-1}(r,z)$ and $\Phi_{2n}(r,z)$ and by means of these new functions he constructs differential equations for 5 and for 9 points. At first the author endeavors to determine the function u(r, z) satisfying the equation (1) in the domain

Card 1/3

1/ Predstavleno akademikom S.L. Sobolevym. (Harmonic functions)

On the Solution of Laplace's Equation With Axial Symmetry by a Difference Method 20-114-4-4/63

G of the r, z-plane enclosed by the edge $\Gamma$ and assumes given values on $\Gamma$. The domain G is covered by a quadratic net of the spacing h and the coordinates of any node are denoted by $r_0$, $z_0$. A lemma necessary for these investigations is given. The functions $\Phi_{2n-1}(r,z)$ and $\Phi_{2n}(r,z)$ can be constructed by the application of harmonic polynominals and further functions given here; they are written down explicitly for n = 0,1,2,3, 4. By means of these functions the differential equations for any number of nodes may be computed. The difference relations determined from 5 points are then given explicitly for a quadratical net of the spacing h. Also the differential relations determined from 9 points are written down ecplicitly. The linear system of equations can be obtained either by means of the iteration method or by successive groupwise elimination of the unknown by transforming the matrices. As a practical example the author investigates the determination of the electric field strength in the interior of a cylindrical cage. There are 3 references, 3 of which are Soviet.

Card 2/3

AUTHOR: Davidenko, D.F. 20-118-6-4/43

TITLE: On a Difference Method for the Solution of the Poisson Equation With an Axial Symmetry (Ob odnom raznostnom metode resheniya uravneniya Puassona s osevoy simmetriyey)

PERIODICAL: Doklady Akademii Nauk, 1958, Vol 118, Nr 6, pp 1066-1069 (USSR)

ABSTRACT: The difference method with quadratic nets proposed by the author [Ref 1] two years ago for the Laplace equation, now is used also for the Poisson equation. An example shows the high exactness of the method (agreement of the first five decimals for a length of steps 0,25). Unfortunately the application of the method is combined with very extended calculations. There are 3 Soviet references.

PRESENTED: September 28, 1957, by S.L.Sobolev, Academician
SUBMITTED: August 22, 1957

1. Predstavleno akademikom S.L. Sobolevym.
(Difference equations) (Harmonic functions)

Card 1/1

16(1),16(2) SOV/20-126-3-3/69

AUTHOR: Davidenko,D.F.

TITLE: On the Use of Nets in Solving Dirichlet's Axially Symmetrical Problem for Laplace's Equation

PERIODICAL: Doklady Akademii nauk SSSR,1959,Vol 126,Nr 3,pp 471-473 (USSR)

ABSTRACT: In the present paper the author improves his earlier results [Ref 1]. For the solution of the axial-symmetric Dirichlet problem for

$$\frac{1}{r}\frac{\partial u}{\partial r} + \frac{\partial^2 u}{\partial r^2} + \frac{\partial^2 u}{\partial z^2} = 0$$

with the aid of nets, in [Ref 1] the author gave 9-point difference relations the coefficients of which were partially negative. Now the method is modified so that all coefficients become positive and a better exactness is reached.
There is 1 Soviet reference.

PRESENTED: February 11, 1959, by S.L.Sobolev, Academician

SUBMITTED: November 16, 1958

Card 1/1

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050981(

16(1) SOV/20-126-4-2/62

AUTHOR: Davidenko, D.F.

TITLE: On the Question of Numerical Determination of Stokes' Stream Function

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 126, Nr 4, pp 699-702 (USSR)

ABSTRACT: The method for the construction of difference equations for the solution of the axialsymmetric Dirichlet problem for the Laplace equation proposed by the author in an earlier paper [Ref 1] is used in the present paper for the solution of the analogous problem for the equation

$$L[u] = \frac{\partial^2 u}{\partial z^2} - \frac{1}{r}\frac{\partial u}{\partial r} + \frac{\partial^2 u}{\partial r^2} = 0 .$$

A numerical example is given. It shows that the method may yield very good values. A general error estimation is not given. There are 2 references, 1 of which is Soviet, and 1 American.

PRESENTED: February 11, 1959, by S.L.Sobolev, Academician

SUBMITTED: November 3, 1958

Card 1/1

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66718

16(1)

AUTHORS: Davidenko, D.F., Biryuk, G.I. SOV/20-129-2-3/66

TITLE: On the Solution of the Dirichlet Interior Problem for the Laplace Equation by the Use of Nets

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 129, Nr 2, pp 246-249 (USSR)

ABSTRACT: The method proposed by the authors /Ref 1/ for the solution of the axialsymmetric Dirichlet problem for the Laplace equation is applied to the plane Dirichlet problem. Especially for the case of a quadratic net with the step h the authors set up a 9-point-difference equation for an arbitrary knot; the error has the order of $h^5$. For internal knots the well-known result of Sh.Ye.Mikeladze /Ref 2/ is obtained. There are 4 Soviet references.

PRESENTED: July 6, 1959, by S.L.Sobolev, Academician

SUBMITTED: June 16, 1959

Card 1/1

DAVIDENKO, D. F., Cand Phys-Math Sci (diss) -- "A method of constructing differential equations in using the lattice method to solve the Dirichlet problem for Laplace and Poisson equations". Moscow, 1960. 3 pp (Moscow Order of Lenin and Order of Labor Red Banner State U im M. V. Lomonosov, Mech-Math Faculty), 150 copies (KL, No 10, 1960, 125)

69491

16.1500 16.6500

S/020/60/131/04/04/073

AUTHOR: Davidenko, D.F.

16

TITLE: The Evaluation of Determinants by Parameter Variation

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol.131, No.4, pp 731-734

TEXT: Given the quadratic matrix $A(\lambda) = \| a_{ij}(\lambda) \|$ $(i,j=1,2,\ldots,n)$; $\lambda_0 \leq \lambda \leq \lambda^*$. Let the elements $a_{ij}(\lambda)$ be continuous and continuously differentiable on $\lambda_0 \leq \lambda \leq \lambda^*$. Let $\Delta(\lambda)$ be the determinant of $A(\lambda)$, let $\Delta(\lambda) \neq 0$ and

(2) $\qquad \Delta(\lambda_0) = \Delta^{(0)}$

be known. Let $\dfrac{dA(\lambda)}{d\lambda} = \| a'_{ij}(\lambda) \|$.

Lemma: If $A(\lambda)$ on $\lambda_0 \leq \lambda \leq \lambda^*$ has the inverse matrix $A^{-1}(\lambda)$, then for all $\lambda$ of this interval there holds the relation

(3) $$\frac{d\Delta(\lambda)}{d\lambda} = \Delta(\lambda)\, \mathrm{Sp}\left(A^{-1}(\lambda) \frac{dA(\lambda)}{d\lambda}\right).$$

In order to obtain the value of $\Delta(\lambda)$ for an arbitrary $\lambda$, it is proposed to integrate (3) numerically with the initial condition (2).

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The Evaluation of Determinants by Parameter Variation S/020/60/131/04/04/073

For the case where $\Delta(\lambda)$ vanishes anywhere in the interval $\lambda_0 \leq \lambda \leq \lambda^*$, the author gives a complicated modification of the method. There are 5 references: 4 Soviet and 1 Belgian.

PRESENTED: November 16, 1959, by N.N.Bogoljubov, Academician

SUBMITTED: October 22, 1959

Card 2/2

69978

S/020/60/131/05/05/069

16.1500 16.6500

AUTHOR: Davidenko, D.F.

TITLE: The Method of Parameter Variation as Applied to the Evaluation of Eigennumbers and Eigenvectors of Matrices

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 131, No. 5, pp. 1007-1010

TEXT: Given the quadratic matrix $A(\lambda) = \| a_{kj}(\lambda) \|$, $k,j=1,2,\dots,n$, $\lambda_0 \leqslant \lambda \leqslant \lambda^*$. It is shown that an approximate determination of the eigennumbers $p_i(\lambda)$ of $A(\lambda)$ for $\lambda > \lambda_0$ can be reduced to the numerical integration of the system of equations

$$(6) \quad \left\{ \begin{aligned} \frac{dp_i}{d\lambda} &= - \frac{Sp\left[C^*(\lambda,p_i)\,\dfrac{\partial B(\lambda,p_i)}{\partial \lambda}\right]}{Sp\left[C^*(\lambda,p_i)\,\dfrac{\partial B(\lambda,p_i)}{\partial p_i}\right]} \\ \frac{d\,P^{-1}(\lambda,p_i)}{d\lambda} &= -P^{-1}(\lambda,p_i)\,\frac{d\,P(\lambda,p_i)}{d\lambda}\,P^{-1}(\lambda,p_i) \end{aligned} \right.$$

with the initial conditions

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APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050981(

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The Method of Parameter Variation as Applied to the Evaluation of Eigennumbers and Eigenvectors of Matrices

S/020/60/131/05/05/069

(5) $$p_i(\lambda_o) = p_i^{(c)}, \quad P^{-1}(\lambda_o,p_i) = P_o^{-1}.$$

Here $B(\lambda,p_i) = \| A(\lambda) - p_i E \|$, $C(\lambda,p_i) = \| c_{kj}(\lambda,p_i) \|$, where $c_{kj}(\lambda,p_i)$ is the algebraic complement of the element $b_{jk}(\lambda,p_i)$ in the determinant of $B(\lambda,p_i)$, while $P(\lambda,p_i)$ denotes the left upper $(n-1)\times(n-1)$ - corner of $B(\lambda,p_i)$ and has the determinant $\overline{\Delta}(\lambda,p_i)$. The matrix C* is defined by $C(\lambda,p_i) = \overline{\Delta}(\lambda,p_i) C^*(\lambda,p_i)$. An example is considered. The author mentions A.A.Dorodnitsyn. There are 4 Soviet references.

PRESENTED: November 16, 1959, by N.N.Bogolyubov, Academician

SUBMITTED: October 22, 1959

Card 2/2

30833
S/041/61/013/004/004/007
B125/B112

16.3500 16.3900 16.6500

AUTHOR: Davidenko, D. F.

TITLE: A method of setting up difference equations when solving the internal Dirichlet problem for Poisson's equation by the method of nets

PERIODICAL: Ukrainskiy matematicheskiy zhurnal, v. 13, no. 4, 1961, 92-96

TEXT: Sh. Ye. Mikeladze (O chislennom integrirovanii uravneniy ellipticheskogo i parabolicheskogo tipa, Izv. AN SSSR, ser. matem., t. 5, No. 1, 1941, 57 - 73), in solving the Dirichlet problem for Poisson's equation, found difference equations with an error of the order $h^3$ for any boundary nodes, and of the order $h^4$ for a special type of boundary nodes. The solution $u(x,y)$, satisfying the Dirichlet condition at the boundary $\Gamma$, of Poisson's equation $\Delta u = (\partial^2 u/\partial x^2) + (\partial^2 u/\partial y^2) = f(x,y)$ (1) and $f(x,y)$ are assumed to have continuous and bounded derivatives up to the required order in the domain G. When G is covered by an arbitrary net, it must be possible to render (1) in the neighborhood of the point $\alpha_0$ of G in the

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A method of setting up difference... S/041/61/013/004/004/007
B125/B112

form: $u(x,y) = F(x,y) + a_{o,o}\,\Phi_o(x,y) + \sum_{n=1}^{\infty}\left[a_{n-1,1}\,\Phi_{2n-1}(x,y) + a_{n,o}\,\Phi_{2n}(x,y)\right]$,

$F(x,y) = \sum_{k,l=0}^{\infty} c_{kl}(x - x_o)^k (y - y_o)^{l+2}$,

$c_{kl} = \frac{1}{k!(l+2)!}\sum_{j=0}^{E(\frac{l}{2})}(-1)^j \left.\frac{\partial^{k+l} f(x,y)}{\partial x^{k+2j}\partial y^{l-2j}}\right|_{\substack{x=x_o\\ y=y_o}}$. $\alpha_o = \alpha_o(x_o,y_o)$ is an arbitrary node of the net, and $\alpha_i = \alpha_i(x_o + k, y_o + l_i)$ denotes the nodes closest to m. $k_i$, $l_i$ are certain numbers. In analogy to a paper of I. Albrecht and W. Uhlmann (Z. angew. Math. Mech., 37, 1957, 212 - 224), the difference equation $u(x_o,y_o) + \sum_{i=1}^{m} b_i u(x_o + k_i, y_o + l_i) = \Omega^{(m)}(f) + R^{(m)}_{(o,o)}$ (2) is derived for the m+1 nodes of the net. The coefficients $b_i (i = 1,2,\dots,m)$ are defined as solution of the linear equations

X

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S/041/61/013/004/004/007
B125/B112

A method of setting up difference...

$\sum_{i=1}^{m} b_i \Phi_o(x_o + k_i, y_o + l_i) = -1$, $\sum_{i=1}^{m} b_i \Phi_q(x_o + k_i, y_o + l_i) = 0$, $q = 1,2,\ldots, m-1$. In addition, $\Phi^{(m)}(f) = \sum_{i=1}^{m} b_i F(x_o + k_i, y_o + l_i)$. As the remainder is sufficiently small, the difference equation has the form: $u(x_o,y_o) + \sum_{i=1}^{m} b_i u(x_o + k_i, y_o + l_i) = \Phi^{(m)}(f)$ (3). The system of N linear algebraic equations with N unknown quantities, which results from the determination of (3) for each of the n nodes of the net, enables one to determine the approximate value of u(x,y) for all nodes inside G from the given values of u at the boundary Γ. The homogeneous harmonic polynomials

Card 3/5

$$P_{2n}(x, y) = \sum_{\nu=0}^{E\left(\frac{n}{2}\right)} (-1)^{\nu} \frac{x^{n-2\nu} y^{2\nu}}{(n-2\nu)!(2\nu)!}, \quad n = 0, 1, 2, \ldots, \tag{4}$$

$$P_{2n-1}(x, y) = \sum_{\nu=0}^{E\left(\frac{n-1}{2}\right)} (-1)^{\nu} \frac{x^{n-2\nu-1} y^{2\nu+1}}{(n-2\nu-1)!(2\nu+1)!}, \quad n = 1, 2, \ldots \tag{5}$$

satisfy

$$\frac{\partial}{\partial x} P_{2n}(x, y) = \frac{\partial}{\partial y} P_{2n-1}(x, y), \quad \frac{\partial}{\partial x} P_{2n-1}(x, y) = -\frac{\partial}{\partial y} P_{2n}(x, y), \quad n = 1, 2, \ldots \tag{6}$$

After the remainder $R_{0,0}^{(8)}$ and the small terms higher than 7-th order have been eliminated, a difference equation

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A method of setting up difference... S/041/61/013/004/004/007
B125/B112

$$u(x_0, y_0) = \sum_{i=1}^{8} b_i u(x_0 + \bar{k}_i h, y_0 + \bar{l}_i h) - \bar{\Omega}^{(8)}(f), \qquad (8)$$

$$\bar{\Omega}^{(8)}(f) = \sum_{k,l=0}^{k+l<5} h^{k+l+2} c_{kl} d_{kl}.$$

is valid for any node of the net. If $t_i = 1$ ($i = 1,2,\ldots,8$), (8) goes over into the well-known 9-point equation by I. Albrecht and W. Uhlmann. While the present article was in the press, Albrecht and Uhlmann found a general 9-point difference equation for the boundary node of a quadratic net in treating the Dirichlet problem of the inhomogeneous Laplace equation. The solution $u(x,y) = y(\cos x - (1/2))$ for $h = 0.5$ is calculated as an example. There are 5 references: 4 Soviet and 1 non-Soviet.

X

SUBMITTED: November 1, 1960 (Moscow)

Card 5/5

23822

16.3500 16.6500...

S/020/61/138/002/004/024
C111/C222

AUTHOR: Davidenko, D.F.

TITLE: On the estimation of the error in solving the Dirichlet problem for the Laplace equation by means of nets

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 138, no.2, 1961, 267-270

TEXT: In the n-dimensional region D with the boundary S the author considers the equation

$$\Delta u = \sum_{\nu=1}^{n} \frac{\partial^2 u}{\partial x_\nu^2} = 0 \qquad (1)$$

with the condition $u|_s = f$. Taking in D a net with the step h and replacing $\Delta$ by a difference operator $\Delta_h$:

$$\Delta_h u = \Delta u + R(u) \qquad (2)$$

then the strong solution u of (1) can be approximated by numerical solution $\overline{v}_h$ of

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$$\Delta_h \bar{v}_h = 0 , \quad \bar{v}_h|_S = f . \qquad (3)$$

Theorem 1 : In the n-dimensional region D with the boundary S let two functions u and v be defined which assume the same value f on S. Let u be continuous in D + S and harmonic in D ; let the function v be continuous in D + S together with its first and second derivatives, where in D

$$|\Delta v| \leq E , \quad E = \text{const.}$$

Then in D it holds

$$|u - v| \leq \gamma E , \quad \frac{1}{\gamma} = 2 \sum_{\nu=1}^{n} \frac{1}{a_\nu^2} ,$$

where $a_\nu$ ($\nu$ = 1,2,...,n) are the semiaxes of the n-dimensional ellipsoid L in which the region D is contained.

Conclusion : If in theorem 1 instead of the harmonic function a function u is considered which in D satisfies the Poisson equation

$$\Delta u = \varphi(x_1, x_2, \ldots, x_n) \qquad (4)$$

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where $\varphi$ is continuous in D + S then $|u - v| \leq \gamma E_1$ in D, where $E_1 = \max_{D+S} |\varphi - \Delta v|$.

Theorem 2 : In D let two functions u, v be defined which on S assume the values $f_1$, $f_2$. Let u be continuous in D + S and harmonic in D ; let v be continuous in D + S together with its first and second derivatives, where $|\Delta v| \leq E$ in D , E = const. Then in D it holds :

$$|u - v| \leq \gamma E + \varepsilon^* , \quad \frac{1}{\gamma} = 2 \sum_{\nu=1}^{n} \frac{1}{a_\nu^2} , \text{ where } \varepsilon^* = \max_S |f_1 - f_2| ;$$

$a_\nu$ ($\nu = 1,2,\ldots,n$) are the semiaxes of an n-dimensional ellipsoid in which the region D is contained.

Conclusion : In theorem 2 , instead of a harmonic function let be considered a function u which satisfies (4) in D. Then in D :

$|u - v| \leq \gamma E_1 + \varepsilon^*$ , where $E_1 = \max_{D+S} |\varphi - \Delta v|$ $\varepsilon^* = \max_S |f_1 - f_2|$;

If the interpolation function $v_h$ has continuous derivatives up to the

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sedond order in D + S and if it satisfies the condition $|\Delta v_h| \leq E_h$ in D then for the solution of (1) it follows the estimation

$$|u - v_h| \leq \gamma E_h \qquad (5).$$

If in D instead of the Laplace equation (1) the Poisson equation

$$\Delta u = \varphi(x_1, x_2, \ldots, x_n), \quad u|_S = f$$

is solved then $|u - v_h| \leq \gamma \max_{D+S} |\varphi - \Delta v_h|$.

An example for the application of the obtained estimations is considered. The author mentions V.S. Ryaben'kiy, S.A. Gershgorin and S.L. Sobolev. There are 11 Soviet - bloc and 1 non-Soviet-bloc references.

PRESENTED: December 17, 1960, by S.L. Sobolev, Academician

SUBMITTED: September 14, 1960

30692
S/020/61/141/002/002/027
C111/C444

16.6500 16.1500

AUTHOR: Davidenko, D. F.

TITLE: On the computation of eigenvalues and eigenvectors of matrices

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 141, no. 2, 1961, 277-280

TEXT: The method of the author (in Ref. 1: DAN, 131, no. 5, 1007(1960)) is generalized for the calculation of complex eigenvalues of real matrices.

Let matrix $A(\lambda) = \| a_{kl}(\lambda) \|$ $(k,l = 1,2,\ldots, n)$ be given; the parameter $\lambda$ varies in the interval $[\lambda_o, \lambda^*]$. The interesting eigenvalue $p_j(\lambda) = p_{jo}(\lambda) + ip_{j1}(\lambda)$ is assumed to be known for $\lambda = \lambda_o$.

$$p_{jo}(\lambda) = p_{jo}^{(0)}, \quad p_{j1}(\lambda) = p_{j1}^{(0)} \quad \text{for } \lambda = \lambda_o \qquad (1).$$

$a_{kl}$ be continuous on $[\lambda_o, \lambda^*]$ and continuously differentiable. The

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APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050981(

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On the computation of eigenvalues . . . C111/C444

trace of the matrix $C(\lambda, p_{jo}, p_{j1})$ which is adjoint to the matrix $\| A(\lambda) - (p_{jo} + ip_{j1}) E \|$, be different from zero in the point $(\lambda_o, p_{jo}^{(0)}, p_{j1}^{(0)})$. In order to determine $p_j(\lambda)$ for $\lambda > \lambda_o$

$$\omega(\lambda, p_o, p_1) = \mathrm{Det} \| A(\lambda) - (p_o + ip_1) E \| = 0 \qquad (2)$$

is differentiated, the result of which is

$$\mathrm{Sp}\, C(\lambda, p_o, p_1) \frac{dp_o}{d\lambda} + i\, \mathrm{Sp}\, C(\lambda, p_o, p_1) \frac{dp_1}{d\lambda} = \mathrm{Sp}\left[ C(\lambda, p_o, p_1) \frac{dA(\lambda)}{d\lambda} \right] \qquad (3)$$

with regard of Ref. 2 of the author (Ref. 2: DAN, 131, no. 4, 731(1960)). The trace of $C(\lambda, p_o, p_1)$ be different from zero in the domain G of variability of $\lambda$, $p_o$ and $p_1$ which contains $(\lambda_o, p_o^{(0)}, p_1^{(0)})$. After numerous transformations it is stated that (3) is equivalent to

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On the computation of eigenvalues . . . S/020/61/141/002/002/027
C111/C444

the two equations

$$\mathrm{Sp}\, C_0^* \frac{dp_0}{d\lambda} - p_1\, \mathrm{Sp}\, C_1^* \frac{dp_1}{d\lambda} = \mathrm{Sp}\left( C_0^* \frac{dA(\lambda)}{d\lambda} \right),$$

$$p_1\, \mathrm{Sp}\, C_1^* \frac{dp_0}{d\lambda} + \mathrm{Sp}\, C_0^* \frac{dp_1}{d\lambda} = p_1\, \mathrm{Sp}\left( C_1^* \frac{dA(\lambda)}{d\lambda} \right). \qquad (5)$$

There

$$C_0^* = \left\| \begin{matrix} F_0 & -Qu \\ -vQ & 1 \end{matrix} \right\|, \quad C_1^* = \left\| \begin{matrix} F_1 & -M^{-1}u \\ -vM^{-1} & 0 \end{matrix} \right\|,$$

$$u = u(\lambda) = \begin{pmatrix} a_{1,n}(\lambda) \\ a_{2,n}(\lambda) \\ \vdots \\ a_{n-1,n}(\lambda) \end{pmatrix}, \quad v = v(\lambda) = \left\{ a_{n,1}(\lambda),\ a_{n,2}(\lambda), \ldots, a_{n,n-1}(\lambda) \right\},$$

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S/020/61/141/002/002/027

On the computation of eigenvalues . . . C111/C444

$$F_0 = F_0(\lambda, p_0, p_1) = Qu(\lambda)v(\lambda)Q - p_1^2 M^{-1} u(\lambda)v(\lambda) M^{-1}$$

$$F_1 = F_1(\lambda, p_0, p_1) = M^{-1} u(\lambda) v(\lambda) Q + Qu(\lambda)v(\lambda) M^{-1}$$

$$Q = Q(\lambda, p_0, p_1) = L_0(\lambda, p_0) M^{-1} (\lambda, p_0, p_1)$$

$$M = M(\lambda, p_0, p_1) = L_0^2 (\lambda, p_0) + p_1^2 E$$

$$L_0(\lambda, p_0 = \left\| \begin{matrix} a_{11}(\lambda) - p_0 & a_{12}(\lambda) & \dots & a_{1,n-1}(\lambda) \\ a_{21}(\lambda) & a_{22}(\lambda) - p_0 & \dots & a_{2,n-1}(\lambda) \\ \dots & \dots & \dots & \dots \\ a_{n-1,1}(\lambda) & a_{n-1,2}(\lambda) & \dots & a_{n-1,n-1}(\lambda) - p_0 \end{matrix} \right\|$$

If (5) is solved for $dp_0/d\lambda$ and $dp_1/d\lambda$, then

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$$\frac{dp_0}{d\lambda} = \frac{\mathrm{Sp}\, C_0^* \,\mathrm{Sp}(C_0^* \,dA(\lambda)/d\lambda) + p_1^2 \,\mathrm{Sp}\, C_1^* \,\mathrm{Sp}(C_1^* \,dA(\lambda)/d\lambda)}{(\mathrm{Sp}\, C_0^*)^2 + p_1^2(\mathrm{Sp}\, C_1^*)^2}$$

$$\frac{dp_1}{d\lambda} = p_1 \frac{\mathrm{Sp}\, C_0^* \,\mathrm{Sp}(C_1^* \,dA(\lambda)/d\lambda) - \mathrm{Sp}\, C_0^* \,\mathrm{Sp}(C_0^* \,dA(\lambda)/d\lambda)}{(\mathrm{Sp}\, C_0^*)^2 + p_1^2(\mathrm{Sp}\, C_1^*)^2} \quad (6)$$

In order to get $p(\lambda)$ approximatively for a given $\lambda$, the equations (6) are numerically integrated with the initial conditions (1). There every column of $C^* = C_0^* + ip_1C_1^*$ consists of the components of the eigenvector $X(\lambda)$ which belongs to the eigenvalue $p(\lambda)$..

A numerically calculated example is given.

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S/020/61/141/002/002/027

On the computation of eigenvalues . . . C111/C444

There are 4 Soviet-bloc references.

PRESENTED: June 28, 1961, by N. N. Bogolyubov, Academician

SUBMITTED: May 3, 1961

Card 6/6

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050981(

34737

16.6500 16.3500

S/020/62/142/003/002/027
C111/C333

AUTHOR: Davidenko, D.F.

TITLE: Construction of difference equations in solving approximately the Euler-Poisson-Darboux equation

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 142, no. 3, 1962, 510-513

TEXT: The method proposed in the paper of D.F. Davidenko (Ref. 1: DAN, 110, no. 6, 910 (1956)) is used for solving the problem $u|_\Gamma = \varphi$ for the equation

$$\Delta_k u = \frac{k}{r}\frac{\partial u}{\partial r} + \frac{\partial^2 u}{\partial r^2} + \frac{\partial^2 u}{\partial z^2} = 0 \quad . \qquad (1)$$

If $\alpha_0 = \alpha_0(r_0, z_0)$ is a nodal point of an arbitrary net, then it is assumed that in the neighborhood of $\alpha_0$ the representation

$$u(r,z) = a_{0,0}\phi_0^{(k)}(r,z) + \sum_{n=1}^{\infty}\left[a_{n-1,1}\phi_{2n-1}^{(k)}(r,z) + a_{n,0}\phi_{2n}^{(k)}(r,z)\right] \qquad (2)$$

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APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050981(

is possible, where $\phi_{o}^{(k)}(r,z) \equiv 1$, $\phi_{2n-1}^{(k)}(r,z)$, $\phi_{2n}^{(k)}(r,z)$ are linearly independent functions satisfying (1) and the conditions from (Ref. 1), and where the coefficients a are determined from conditions corresponding to (3), (4) in (Ref. 1). The representation (2), as in (Ref. 1), is used for setting up difference equations which approximately replace (1). The author sets up five-point difference equations for arbitrary nodes in the case of a quadratic net, where the error for an arbitrary node has the order $h^3$ and for an internal node the order $h^4$. The author gives nine-point difference equations for the internal nodes of a quadratic net ; the error has the order $h^8$ for nodes which do not lie on the symmetry axis $(k \neq - 2\nu)$ and the order $h^6$ for nodes on the axis. The various difference equations are obtained by using different systems of functions $\phi^{(k)}(r,z)$. L.V. Kantorovich is mentioned in the paper. There are 6 Soviet-bloc references and 1 non-Soviet-bloc reference. 4

PRESENTED: September 9, 1961, by S.L. Sobolev, Academician

SUBMITTED: July 7, 1961

DAVIDENKO, D.F. [Davydenko, D.F.]

Approximate solutions to algebraic equations. Dop. AN URSR no.4:434-437 '62. (MIRA 15:5)

1. Predstavleno akademikom AN USSR Yu.A.Mitropol'skim [Mytropol's'kyi, IU.O.].

(Equations--Numerical solutions)

DAVIDENKO, D.F.

One method for constructing difference equations in connection with the solution of Dirichlet's internal problem for a Poisson equation by the method of nets. Ukr.mat.zhur. 13 no.4:92-96 '61. (MIRA 15:7)
(Difference equations) (Harmonic functions)

L 17130-63 EWT(d)/FCC(w)/BDS AFFTC/ASD/IJP(C)

ACCESSION NR: AP3004964 S/0208/63/003/004/0780/0785

AUTHOR: Davidenko, D. F. (Moscow) 53

TITLE: Solution by method of grids of a Poisson equation with axial symmetry 16

SOURCE: Zhurnal vy*chisl. matematiki i matematich. fiziki, v. 3, no. 4, 1963, 780-785

TOPIC TAGS: difference equation, Poisson equation, axial symmetry, Laplace equation

ABSTRACT: The author, in a previous paper (Ob odnom raznostnom metode resheniya uravneniya Laplasa s osevoy simmetriyey. Dokl. AN SSSR, 1956, 110, No. 6, 910-913) proposed a method for constructing difference equations for the Laplace equation with axial symmetry. There he also constructed 9-point difference equations in the case of a square grid. On the basis of these difference equations he constructed 9-point difference equations for the Poisson equation with axial symmetry in a later paper (Ob odnom raznostnom metode resheniya uravneniya Puassona s osevoy simmetriyey. Dokl. AN SSSR, 1958, 118, No. 6, 1066-1069). However, while it is applicable for nodes not lying on the axis of symmetry, it

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ACCESSION NR: AP3004964

turned out to be cumbersome, which made its practical application difficult. The purpose of this paper is the essential simplification of the indicated difference equation. Here the new difference equation has the same degree of accuracy with respect to the step of the grid has the corresponding equation from the second cited above. Orig. art. has: 27 formulas and 1 table.

ASSOCIATION: none

SUBMITTED: 24Jul62 DATE ACQ: 30Aug63 ENCL: 00

SUB CODE: MM NO REF SOV: 004 OTHER: 001

Card 2/2

DAVIDENKO, D.F. [Davydenko, D.F.]

Use of the method of variation of the parameter in calculating the exponential functions of a real matrix. Dop. AN URSR no.2: 158-163 '64. (MIRA 17:5)

1. Predstavleno akademikom AN UkrSSR YuA.Mitropol'skim [Mytropol's'kyi, IU.O.].

DAVIDENKO, D.F. (Dnepropetrovsk)

Use of the parameter variation method in calculating an adjoint matrix and its determinant. Ukr. mat. zhur. 17 no.3:59-66 '65.

(MIRA 18:6)

L 63569-65 EWT(d) IJP(c)

ACCESSION NR: AP5014842 UR/0020/65/162/003/0499/0502

AUTHOR: Davidenko, D. F.

TITLE: Use of the variation of parameter method for constructing iteration formulas of higher accuracy for determining numerical solutions of nonlinear integral equations

SOURCE: AN SSSR. Doklady, v. 162, no. 3, 1965, 499-502

TOPIC TAGS: approximation calculation, integral equation

ABSTRACT: The author considers the nonlinear integral equation

$$\varphi(s) = \int_a^b F(s, t, \varphi(t))\,dt + f(s) \quad (1)$$

where F(s,t,u) is continuous in the collection of variables (s,t,u) together with $F'_u(s,t,u)$ in some region D; f(x) is a continuous function on [a,b]. It is assumed that an approximate numerical solution

$$\begin{matrix} t_1 & t_2 & \ldots & t_n \\ \Phi_1^{(0)} & \Phi_2^{(0)} & \ldots & \Phi_n^{(0)} \end{matrix} \quad (2)$$

where $a \leq t_1 < t_2 < \ldots < t_n \leq b$, of (1) is given, and that it is desired to raise the

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ACCESSION NR: AP5014812

accuracy of this solution to a specified degree of accuracy. Using arbitrary quadrature formulas such as Euler's, Euler-Cauchy, and Runge-Kutta, with the aid of variation of parameters, such iteration formulas are constructed. The method can be directly applied to general nonlinear functional equations. The author considers the specific $\varphi(s) = \int K(s, t, \varphi(t))\,dt$ using the three methods listed above, and refers to other works for estimates of the error. "I use this opportunity to express my heartfelt gratitude to Academician N. N. Bogolyubov for his attention." Orig. art. has: 16 formulas.

ASSOCIATION: Institut atomnoy energii im. I. V. Kurchatova (Atomic Energy Institute)

SUBMITTED: 21Oct64 ENCL: 00 SUB CODE: MA

NO REF SOV: 011 OTHER: 000

Card 2/2

L 59336-65 EWT(d) Pg-4 IJP(c)
ACCESSION NR: AP5015608 UR/0020/65/162/004/0743/0746

AUTHOR: Davidenko, D. F.

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B

TITLE: Application of the variation of parameter method to construction of iteration formulas of raised accuracy for determining the elements of the inverse matrix

SOURCE: AN SSSR. Doklady, v. 162, no. 4, 1965, 743-746

16

TOPIC TAGS: approximation calculation, differential equation, matrix algebra

ABSTRACT: The author constructs higher accuracy iteration formulas for making more precise the approximate values of the inverse matrix $A^{-1}(\lambda)$ obtained by the method of variation of parameters (or some other method). He also uses variation of parameters, which involves construction of a differential equation satisfied by $A^{-1}(\lambda)$, which is numerically integrated. Convergence to the desired result occurs even in cases where other known iteration formulas fail. Orig. art. has: 9 formulas.

ASSOCIATION: Institut atomnoy energii im. I. V. Kurchatova (Atomic Energy Institute)

SUBMITTED: 21Oct64 ENCL: 00 SUB CODE: MA

NO REF SOV: 006 OTHER: 000

Card 1/1 dlP

DAVIDENKO, D.F. (Moskva)

Approximate computation of determinants. Ukr. mat. zhur. 17 no.5:14-27 '65. (MIRA 18:12)

1. Submitted May 19, 1961.

L 16137-66 EWT(d) IJP(c)
ACC NR: AP6004643 SOURCE CODE: UR/0041/65/017/005/0014/0027

AUTHOR: Davidenko, D. F. (Moscow)

ORG: none

29
B

16,44,55

TITLE: Approximate calculation of determinants

SOURCE: Ukrainskiy matematicheskiy zhurnal, v. 17, no. 5, 1965, 14-27

TOPIC TAGS: differential equation, determinant, approximation calculation

ABSTRACT: The author investigates the problem of approximate determination of the value of the determinant $\Delta(\lambda)$ of a matrix $A(\lambda)$ for a given region $\lambda_0 \leq \lambda \leq \lambda^*$. His method consists of numerical integration of a differential equation satisfied by $\Delta(\lambda)$. He claims that his method always yields the desired accuracy. Orig. art. has: 3 tables and 46 formulas.

SUB CODE: 12/ SUBM DATE: 19May61/ ORIG REF: 008/ OTH REF: 001

Card 1/1 Da

2

DAVIDENKO, G. (gorod Odessa); RODIONOV, V. (gorod Odessa); POBEGAYLO, D. (gorod Kamenets, BSSR); CHERNYAVSKIY, N. (Khabarovskiy kray).

Prolong the duration of films. (Responses to comrade Khromykh's article). Kinomekhanik no.4:28-30 Ap '53. (MLRA 6:5)

DAVIDENKO, I. A.

At the Dnepropetrovsk Mining Institute in Artem Sergeyev from April 1939 to April 1947, the following dissertations were defended in connection with attaining the scholarly degree of Candidate of Technical Science (specializing in mining electrical engineering: I. A. Davidenko on 29 July 1940 defended his dissertation on the subject "Magnetic defectoscopy for lifting cables".

The official opponents of this dissertation were the late Doctor of Technical Sciences Professor V. B. Umanskiy and Candidate of Physical-Mathematical Sciences I. I. Teumin.

A length of cable was investigated, made of twisted steel wire, which was magnetized by placing a coil upon it which was driven at a constant speed. The magnetizing winding was supplied with direct current. The coil also possessed a secondary winding. Defects in the cable (broken wires, abrasion) caused a change in the magnet current. The electromotive force in the second winding was amplified and recorded on an oscillograph. As a result it was determined that the sensitivity of the method is limited by the non-homogeneous structure of the cable and not by the recording instruments, as was supposed previously.

SO: Elektrichestvo [Electricity], No. 10, October 1947. Moscow.

DAVIDENKO, I.A.; PIROTSKII, P.P.

Measuring the fluctuations of fluid level. Izm.tekh. no.5:75-76 S-O '56. (MLRA 10:2)

(Liquid level indicators)

10.

AUTHORS: Davidenko, I.A. and Pirotskiy, P.P. (Dnepropetrovsk Mining Institute). 168

TITLE: The choice of electrical drive for disintegrators. (Vybor elektricheskogo privoda dezintegratorov).

PERIODICAL: "Koks i Khimiya" (Coke and Chemistry), 1957, No.3, pp.51-52 (U.S.S.R.)

ABSTRACT: Some recommendations as to the choice of motors for crushers in coal preparation plant on coke oven works are given. There is one table.

DAVIDENKO, I. I.

AUTHOR: Davidenko, I.I. (Krasnodar) 26-12-48/49

TITLE: A Giant Mushroom (Grib - velikan)

PERIODICAL: Priroda, 1957, # 12, p 127 (USSR)

ABSTRACT: In a letter to the editor, I.I. Davidenko describes a giant puff ball (Lycoperdon giganteum) he found in 1935 in the Spikoynensk district in the Krasnodar province. It was 59 cm long, 35 cm wide, 34 cm high and weighed 8.7 kg.

AVAILABLE: Library of Congress

Card 1/1

DAVIDENKO, I.I.

Outcome of periradicular granulomas. Probl. stom. 5:213-218 '60. (MIRA 15:2)

1. Khar'kovskiy meditsinskiy stomatologicheskiy institut. (JAWS—TUMORS)

DAVIDENKO, Ivan Ivanovich; FILIMONOVA, D.S., red.

[Organization of work at a landing] Organizatsiia rabot na nizhnem sklade. Arkhangel'sk, Arkhangel'skoe knizhnoe izd-vo, 1963. 35 p. (MIRA 17:5)

1. Tekhnoruk Khoz'minskogo lesopunkta Vel'skogo lesopromyshlennogo khozyaystva Arkhangel'skoy oblasti (for Davidenko).

DAVIDENKO, I.M.

BOSYY, M.K.; MAKARUK, A.I.; DAVIDENKO, I.M.

Investigations on the after-effect of conditioned inhibition induced by extra stimuli. Biul.eksp.biol. i med. 40 no.10: 3-5 Oct. '55. (MLRA 9:1)

1. Iz Cherkasskogo pedagogicheskogo instituta (dir.-dotsent A.V. Tkanko)
(REFLEX, CONDITIONED,
after-eff. of conditioned inhib. induced with extra stimulus)

BOSIY, M.K. [Bosyi, M.K.]; DRAGUN, G.D. [Drahun, H.D.]; KOVTUN, A.P.; KOLYADENKO, G.I. [Koliadenko, H.I.]; DAVIDENKO, I.M. [Davydenko, I.M.] MAKARUK, G.I. [Makaruk, H.I.]

Studying the consecutive inhibition of a single and summed effect of differentiated inhibition in dogs by the conditioned reflex method. Report No.4. Nauk.zap. ChDPI 8:27-39 '56. (MIRA 11:2)
(INHIBITION) (CONDITIONED RESPONSE)

DAVIDENKO, I.M.

BOSIY, M.K. [Bosyi, M.K.]; KOLYADENKO, G.I. [Koliadenko, H.I.]; MAKARUK, G.I. [Makaruk, H.I.]; DAVIDENKO, I.M. [Davydenko, I.M.]

Studying the aftereffect of conditioned inhibition by the conditioned reflex method. Nauk. zap. ChDPI 8:93-104 '56. (MIRA 11:2)

(INHIBITION) (CONDITIONED RESPONSE)

BYSYY, M.K.; DAVIDENKO, I.M.

Successive inhibition from the effect of a secondary inhibitory stimulus. Zh. vyssh. nerv. deiat. Pavlov 13 no.3:495-500 '63. (MIRA 17:9)

1. Fiziologicheskaya laboratoriya Cherkasskogo pedagogicheskogo instituta.

(REFLEX, CONDITIONED)

DAVIDENKO, I.V.

Prospecting signs of crystal-bearing pegmatites. Razved. i okh. nedr 28 no.12:5-9 D '62. (MIRA 16:5)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut mineral'nogo syr'ya.

(Pegmatites)

DAVIDENKO, I.V.

Alkalinity and acidity of the pegmatite process. Min.syr'e no.7: 34-38 '63. (MIRA 16:9)
(Pegmatites—Analysis) (Hydrogen-ion concentration)

RODIONOV, G.G.; DAVIDENKO, I.V.

Some geochemical characteristics of pegmatite formation in various formations. Geol. mest. red. elem. no.22: 115-129 '64.
(MIRA 17:7)

DAVIDENKO, I.V.

Energy of the crystal lattices of silica and silicate modifications. Dokl. AN SSSR 164 no.3:670-673 S '65. (MIRA 18:9)

1. Vsesoyuznyy institut mineral'nogo syr'ya. Submitted March 10, 1965.

RADOVIC, Aleksandar, sanitetski major dr.; DEBIJADI, Rudi, sanitetski
potpukovnik dr.; DAVIDOVIC, Jovan, biolog dr.

Effect of the pressure suit on the cardiovascular systems.
Vojnosanit. pregl. 22 no.10:610-615 O '65.

1. Vazduhoplovnomedicinski institut.

DAVIDOVIC, Jovan, biolog dr.; DEBIJADI, Rudi, sanitetski potpukovnik dr.; ELCIC, Stojanka, biolog; DAVIDOVIC, Vukosava, biolog

The effect of noise on the resistance to acute hypoxia. Vojnosanit. pregl. 22 no.10:625-627 O '65.

1. Vazduhoplovnomedicinski institut.

KHIROV, A.A., nauchnyy sotrudnik; DAVIDENKO, L.K., nauchnyy sotrudnik

Pests of pine grafts and their control. Zashch. rast. ot vred. i bol. 7 no.9:50 S '62. (MIRA 16:8)

1. Borovaya lesnaya opytnaya stantsiya Vsesoyuznogo nauchno-issledovatel'skogo instituta lesovodstva i mekhanizatsii lesnogo khozyaystva.

(Buzuluk region—Pine—Diseases and pests)

(Buzuluk region—Insects, Injurious and beneficial—Control)

LUK'YANCHIKOV, V.P.; TRON', Ye.A., mladshiy nauchnyy sotrudnik; KHASANKAYEV, Ch.S.; ZLOTIN, A.Z.; GEVLICH, O.P., mezhrayonnyy lesopatolog; DAVIDENKO, L.K., nauchnyy sotrudnik; SATEYEV, A.F., mladshiy nauchnyy sotrudnik

Brief information. Zashch. rast. ot vred. i bol. 9 no.3: 53-55 '64. (MIRA 17:4)

1. Biologicheskiy institut Sibirskogo otdeleniya AN SSSR, Novosibirsk (for Luk'yanchikov). 2. Ternopol'skaya sel'skokhozyaystvennaya opytnaya stantsiya (for Tron'). 3. Tatarskaya lesnaya opytnaya stantsiya (for Khasankayev). 4. Grakovskoye opytnoye pole, Vsesoyuznyy nauchno-issledovatel'skiy institut khimicheskikh sredstv zashchity rasteniy (for Zlotin). 5. Borovaya lesnaya opytnaya stantsiya (for Davidenko). 6. Karagandinskiy botanicheskiy sad AN KazSSR (for Sateyev).

DAVIDENKO, M.

Drying seed corn on cobs at the Kamenka Grain Receiving Station. Muk.-elev.prom. 30 no.1:24 Ja '64. (MIRA 17:3)

1. Zamestitel' direktora Kamenskogo khlebopriyemnogo punkta Cherkasskoy oblasti.

DAVYDENKO, M.A.

USSR / General and Specialized Zoology. Insects. P
Insect and Mite Pests.

Abs Jour : Ref Zhur - Biol., No 10, 1958, No 44792

Author : Davdenko, M. A.
Inst : AS latvSSR
Title : Chemical Methods of Controlling the Pest of Technical Cultures Under the Conditions of the Latvian SSR.

Orig Pub : Sb. tr. po zashchite rast. Riga, AN Latv SSR, 1956, 59-66.

Abstract : Dusting flax seeds with 12% hexachlorocyclohexane (HCCH) (1 kg/c) and dusting the sprouts when the flea beetles appeared in mass were very effective against the blue and the black flax flea beetles (respectively, Aphthona euphorbiae Schrank. and Longitarsus parvulus Payk.), especially when there was an early planting of fiber

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USSR / General and Specialized Zoology. Insects P
Insect and Mite Pests.

Abs Jour : Ref Zhur - Biol., No 10, 1958, No 44792

flax. The dusting of the seeds increased field germination and the density of the stems when the crop was harvested. HCCH stimulated the growth of flax in the first 3 weeks, increased the yield of straw and of seeds, of the fiber output and its quality. When 10% chlordane dust (200 kg/ha) was applied to leached out turf-carbonated clayey soil, the number of larvae of the eastern May beetle, Melolontha hippocastani F., decreased 79%, when 25% HCCH dust was placed (85 kg/ha) they were decreased by 71%; the field germination of sugar beet seeds increased 9%; 2.75% of the plants were damaged by the flea beetles (37.8% in the control); the yield of beets increased by 33.7% (18.6% from HCCH). -- A. P. Adrianov.

Card 2/2

DAVIDENKO, M.O. [Davydenko, M.O.]

Machinery operators are in the forefront of the struggle to fulfill the resolutions of the Party. Mekh. sil'. hosp. 12 no. 3:1-2 Mr '61. (MIRA 14:4)

1. Zanestitel' ministra sel'skogo khozyaystva USSR. (Agriculture)

DAVIDENKO, M.O. [Davydenko, M.O.]

Introducing over-all maintenance and repair of the machinery and tractor pool on collective farms. Mekh. sil'. hosp. 14 no.4: 6-7 Ap '63. (MIRA 16:10)

1. Zamestitel' predsedatelya Ukrainskogo respublikanskogo ob"yedineniya "Ukrsil'gosptekhnika".

DAVIDENKO, N.

We are facing great tasks. Okhr. truda i sots. strakh. 6 no.11:16-17 N '63. (MIRA 16:11)

1. Zamestitel' predsedatelya Vsesoyuznogo ob"yedineniya Soveta Ministrov SSSR po prodazhe sel'skokhozyaystvennoy tekhniki, zapasnykh chastey, mineral'nykh udobreniy i drugikh material'no-tekhnicheskikh sredstv, organizatsii remonta i ispol'zovaniya mashin v kolkhozakh i sovkhozakh.

DAVIDENKO, N.G., inzhener; KOLOTILOV, P.Ya.,

Improving the techniques of making brake shoes. Stroi.i dor. mashinostr. 1 no.10:33-34 O '56. (MLRA 9:11)
(Kharkov--Brakes)

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050981(

DAVIDENKO, N.I.

21(8) PHASE I BOOK EXPLOITATION SOV/[illegible]

Vsesoyuznaya nauchno-tekhnicheskaya konferentsiya po primeneniyu radioaktivnykh i stabil'nykh izotopov i izlucheniy v narodnom khozyaystve i nauke. Moscow, 1957.

Trudy... Mashinostroyeniye i priborostroyeniye (Transactions of the All-Union Conference on the Use of Radioactive and Stable Isotopes and Radiation in the National Economy and Science; Machine and Instrument Manufacturing) Moscow, Izd-vo AN SSSR, 1958. 398 p. 4,500 copies printed.

Sponsoring Agencies: USSR. Glavnoye upravleniye po ispol'zovaniyu atomnoy energii, and Akademiya nauk SSSR.

Editorial Board of Set: V.I. Dikushin, Academician (Resp. Ed.), N.N. Shumilovskiy (Deputy Resp. Ed.), Yu. S. Zaslavskiy (Deputy Resp. Ed.), L.K. Tatochenko, B.I. Verkhovskiy, S.T. Nazarov, L.I. Petrenko and N.G. Zelevinskaya (Secretary).

Ed. of Publishing House: P.N. Belyanin; Tech. Ed.: T.P. Polenova.

PURPOSE: This book is intended for specialists in the field of machine and instrument manufacture who use radioactive isotopes in the study of materials and processes.

COVERAGE: This collection of papers covers a very wide field of the utilization of tracer methods in industrial research and control techniques. The topic of this volume is the use of radioisotopes in the machine-and instrument-manufacturing industry. The individual papers discuss the applications of radioisotope techniques in the study of metals and alloys, problems of friction and lubrication, metal cutting, engine performance, and defects in metals. Several papers are devoted to the use of radioisotopes in the automation of industrial processes, recording and measuring devices, quality control, flowmeters, level gauges, safety devices, radiation counters, etc. These papers represent contributions of various Soviet institutes and laboratories. They were published as Transactions of the All-Union Conference on the Use of Radioactive and Stable Isotopes and Radiation in the National Economy and Science, April 4-12, 1957. No personalities are mentioned. References are given at the end of most of the papers.

24905 S/181/61/003/006/002/031
B102/B201

24.7600

AUTHORS: Davidenko, N.I., Samokhvalov, A.A., and Fakidov, I.G.

TITLE: Anisotropy of the longitudinal thermomagnetic Nernst-Ettingshausen-effect in magnetite in the low-temperature transition region

PERIODICAL: Fizika tverdogo tela, v. 3. no. 6, 1961, 1650 - 1653

TEXT: The crystal structure of magnetite is modified at about 120°K, and, as a consequence, all physical properties are practically changed. In connection with the theory by Verwey et al. (J. Chem. Phys. 15, 181, 1947), in which the 3d electrons are assumed to rearrange in the transition point, it is of interest to study the anisotropy of various properties of magnetite, as it may serve to verify the theory. The authors studied the anisotropy of the longitudinal thermomagnetic Nernst-Ettingshausen effect (1.th. N-E.E.) in the transverse magnetic field. A report is given of relative results. For measuring the 1.th.N-E.E., the sample was introduced into a cryostat cooled with liquid nitrogen.

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24905 S/181/61/003/006/002/031

Anisotropy of the longitudinal... B102/B201

By two heaters at the sample ends, it was possible to establish any temperatures between 77 and 200°K. Two copper-constantan thermocouples served for measuring the temperature. The samples were cut from natural magnetite single crystals and had a cylindrical shape (3 mm in diameter, 10-15 mm long) with the axis parallel to the [110] direction (the orientation was checked roentgenographically). Temperature gradient and direction of the measurement of the l.th.N-E.E. likewise coincided with the [110] direction. The constant magnetic field of 20,400 oe was in the (110) plane, perpendicular to [110]. During the measurement of the l.th.N-E.E. the samples were rotated about the axis by 360°, first in one, then in the opposite direction, and a measurement was made every 10°. The mean values were then calculated from four measured values at each point. The anisotropy of the l.th.N-E.E. was measured on five samples in the 90 - 160°K range. Fig. 1 presents the l.th.N-E.E. as a function of the orientation of the magnetization vector with respect to the [001] direction; the relative change of the thermo-emf in the magnetic field, which is related to the value of the l.th.N-E.E. by the relation $\Delta\alpha/\alpha = E_{N-E.}/(\alpha\Delta T/\Delta x)$, is taken as the ordinate. The study

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